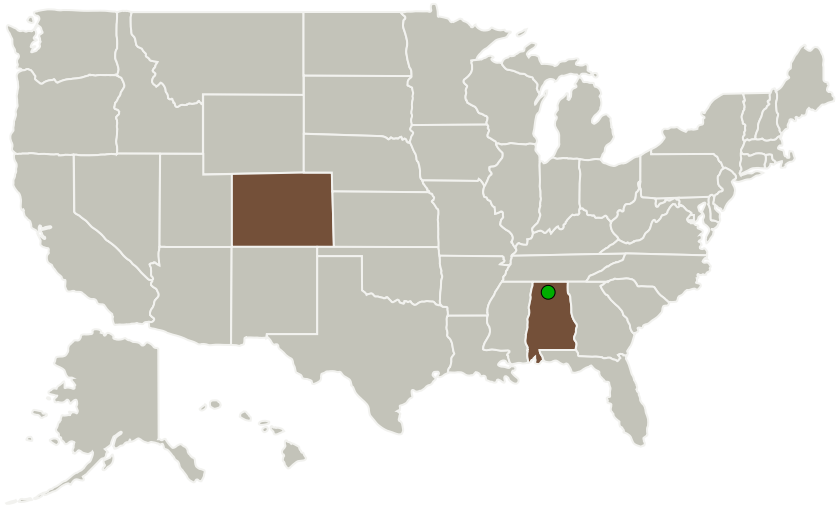
Microcrack Resistant Matrix Materials for Out-of-Autoclave Processing of Composite Cryogenic Tanks, Phase II

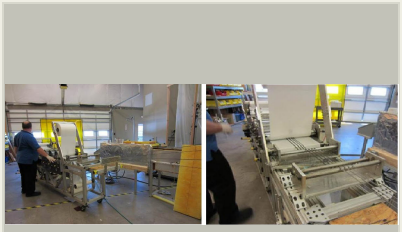
Completed Technology Project (2013 - 2015)

Project Introduction

NASA is keen on advancing technologies for lightweight composite cryotanks for heavy lift vehicles for future NASA missions. Two primary challenges must be overcome to enable the use of composite tanks for these new classes of heavy launchers. One is to develop novel, microcrack-resistant, polymer matrix composite materials that will enable the manufacture of 5 to 10 meter diameter composite tanks, and the second is to develop out-of-autoclave manufacturing methods. In response, CTD is developing novel matrix materials based on toughened epoxy and benzoxazines to meet these goals and exceed the performance of current state of the art materials. The end goal of the Phase II program is to advance the material systems suitable for out-of-autoclave fabrication of very large cryotank (10 meter diameter) structures from TRL 3 to TRL 4. The proposed Phase II SBIR program will be a synergistic effort between analytical assessments of material performance requirements, material and process development, testing to assess material performance improvements and the ability to manufacture these novel materials into microcrack resistant composites laminates and cryotanks.

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
Composite Technology Development, Inc.	Lead Organization	Industry	Lafayette, Colorado
Marshall Space Flight Center(MSFC)	Supporting Organization	NASA Center	Huntsville, Alabama

Primary U.S. Work Locations	
Alabama	Colorado

Project Transitions

July 2013: Project Start

July 2015: Closed out

Images

Project Image
Microcrack Resistant Matrix Materials for Out-of-Autoclave Processing of Composite Cryogenic Tanks
(https://techport.nasa.gov/image/127852)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Composite Technology Development, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

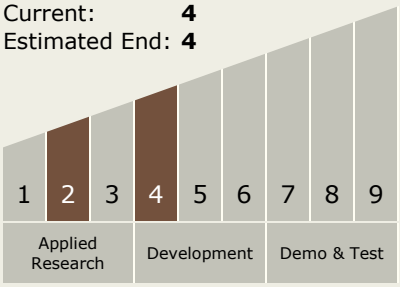
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Paul Fabian

Technology Maturity (TRL)

Start: **2**
Current: **4**
Estimated End: **4**



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Technology Areas

Primary:

- TX13 Ground, Test, and Surface Systems
  - TX13.1 Infrastructure Optimization
    - TX13.1.7 Impact/Damage/Radiation Resistant Systems

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System